

# Installation Instructions

## Fresh Water Cooling System


7.4Gi

3857597-3

### Safety Considerations

These instructions will alert you to certain things you should do very carefully. If you don't, you could

- hurt yourself or bystanders
- hurt the boat operator or bystanders
- damage the machinery

Safety symbol, , appears next to information important to prevent you and others from being hurt.

Note symbol, **Note!**, appears next to information important to keep machinery from being damaged.

**IMPORTANT:** The safeguards and instructions appearing in these instructions cannot cover all possible conditions or situations that occur. The person following these directions must use common sense, caution, and care.

### **Product Reference and Illustration**

When reference is being made to a brand name, product, or specific tool, an equivalent product may be used in place of the referred to product. Substitute products used must have equivalent characteristics, including type, strength, and material. Incorrect substitution may result in product malfunction and possible injury to the operator and/or passengers.

All photographs and illustrations used may not necessarily depict actual models or equipment, but are intended only for reference. Specifications used are based on the latest product information available at the time of publication.

**VOLVO  
PENTA**

## Kit Contents

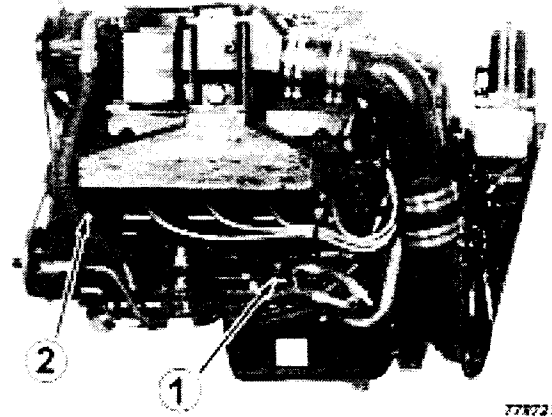
P/N	Description	Qty.
940119-1	6-40 Nut UNF	2
942700-6	Hose	1.5M
943369-9	Hose	1.7M
945652-6	Hose clamp	6
945657-5	Clamp	3
950004-2	UNF screw, 6-40x1/2	2
955688-7	7/16-20 FH cap screw	2
861105-5	Expansion tank	1
961666-5	Hose clamp	3
961667-3	Hose clamp	1
961670-7	Hose clamp	2
961672-3	Hose clamp	2
968145-3	Plug, 3/8-18 NPSF	1
968146-1	Plug, 1/2-14 NPSF	1
973528-3	Spacer	1
3851383-4	Thermostat housing, upper	1
3851384-2	Thermostat housing, lower	1
3851394-1	Bracket	1
3851396-6	Compression band	1
3851587-0	Heat exchanger	1
3851593-8	Hose	1
3851595-3	Brace	1
3852111-8	Gasket	2
3852602-6	Clamp	2
3852746-1	Hose	1
3853401-2	Bolt	2
3855719-5	J-Clamp	1
3858329-0	Bracket, expansion tank	1
3857422-4	Bracket, expansion	1
1674083-9	Cap, expansion tank	1
3851413-9	Connecting pipe	2
3851591-2	Hose	1
3851592-0	Hose	1
3851962-5	Spacer	2
3853391-5	Screw	1
3853598-5	Pipe elbow	1
479974-8	Nipple	1
857500-3	Hose	1
875788-2	Thermostat kit	1
945444-8	Flange screw, 8x25	2
946173-2	Flange screw, 8x20	4
948645-7	Lock nut	6
860994-3	Decal	1
3851596-1	Fitting	1

## Tools Required

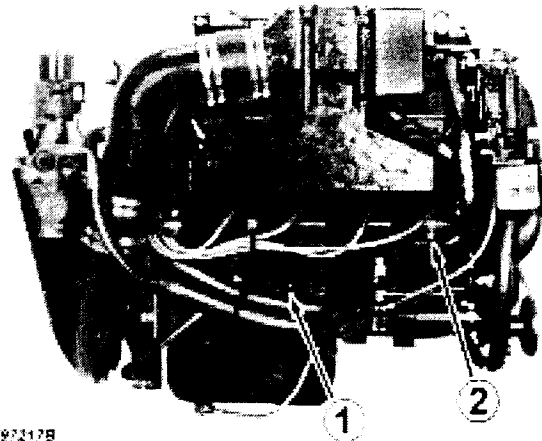
9/16 X 3/8 in.	Socket
3/8 X 3 in.	Extension
3/8 in.	Ratchet
3/8 X 3/8 in.	Allen head socket
7/8 X 3/8 in.	Deep Socket
1/4 in.	Straight tip screwdriver
# 2	Phillips screwdriver
5/16 in.	Combination wrench
9/16 in.	Allen Wrench
9/16 X 3/8 in.	Deep Socket
5/8 X 3/8 in	Socket
13 mm	Combination wrench
12mm X 3/8 in	Socket
	Adjustable Wrench
	Diagonal Cutter
	Gasket Scraper

## Installation

**▲WARNING** Install the Fresh Water Cooling (FWC) Kit with the boat out of the water to prevent the risk of water entering the boat.



7787217A



7787217B

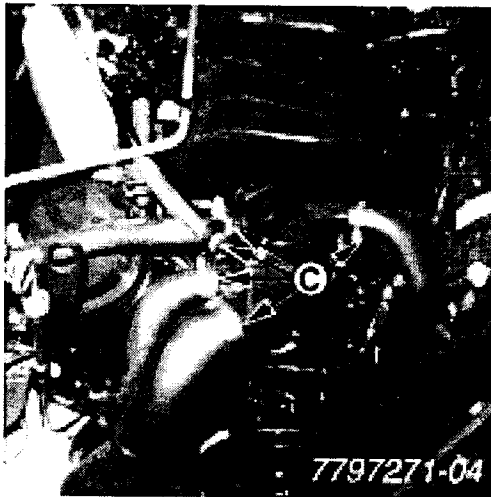
Drain all seawater from engine by opening the drain cocks (1) on the Port and Starboard sides of the engine block. Use a piece of wire to remove any debris that may block the drain cock. Disconnect the large supply hose from the engine circulation pump and drain. Remove the hoses (2) from the port and starboard exhaust manifolds and drain. Use a piece of wire to remove any debris to ensure complete drainage.



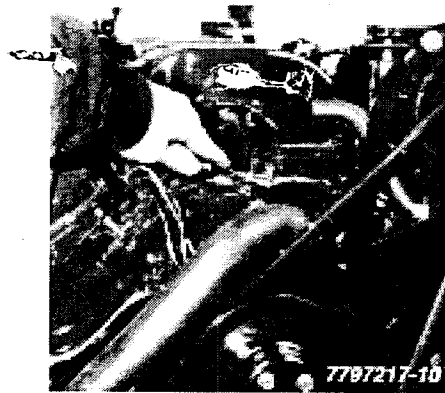
Cut the tie wrap holding the raw water pump hose and the circulation pump hose together.



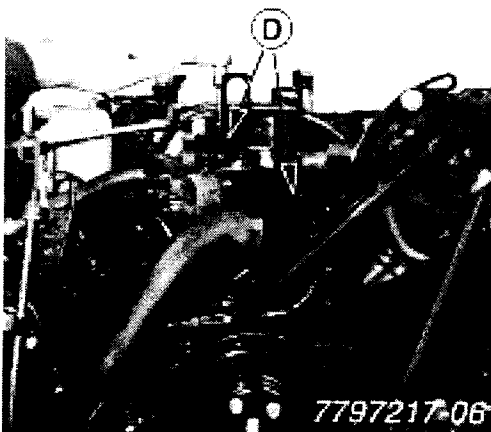
Using a 9/16 in. socket, remove the bolts holding the thermostat housing adapter to the intake manifold.



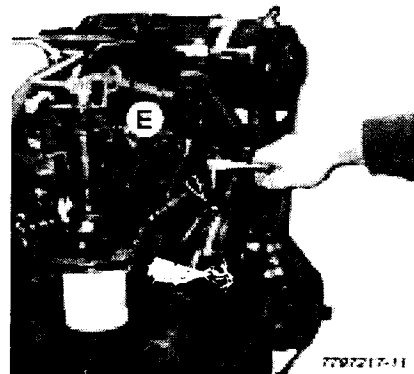
Loosen hose clamps (C) and remove all hoses from the thermostat housing leaving the hoses attached at their other ends.



Use a gasket scraper and clean the gasket material from the surface of the intake manifold.

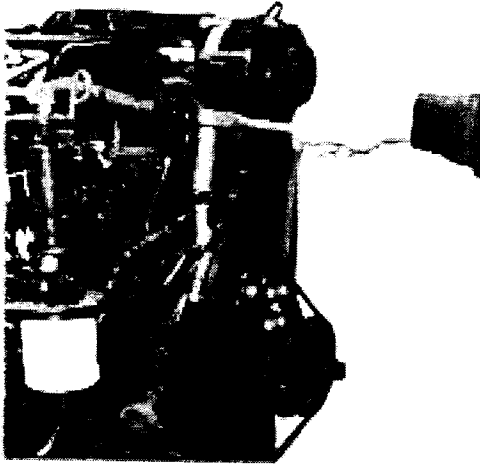


Remove the two bolts holding the upper thermostat housing and remove the housing.

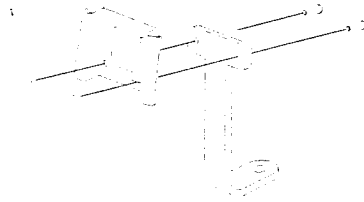


Use a 3/8 in. allen head socket and ratchet, remove the 1/2 inch NPT plug (E) in the top of the circulation pump.

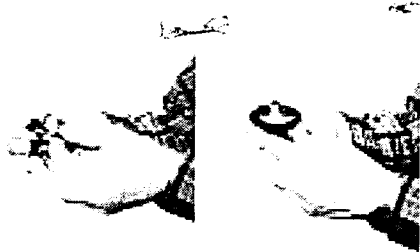
**CAUTION** *Disconnect the ECM temp switch connector to prevent the ratchet from braking the connector.*



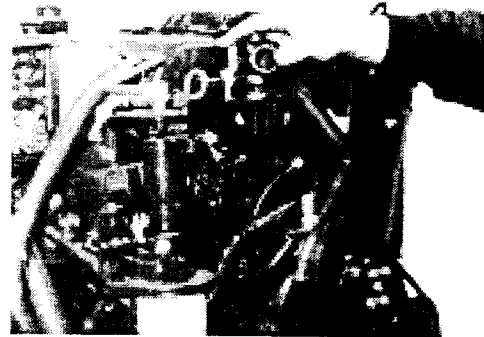
Use a 7/8 in. deep socket to install the 1/2 NPT straight hose nipple 479974-8 on the engine circulation pump.



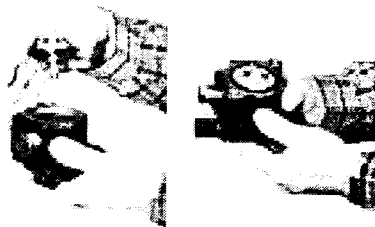
Using a phillips head #1 screwdriver, assemble expansion tank bracket 3857422-4 to 3858329-0 with two screws 950004-2 and nuts 940119-1.



Mount the rubber ring around the thermostat.

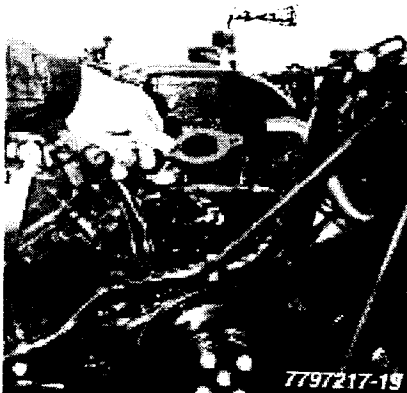


Using the long thermostat housing bolt 3853391-5, mount the thermostat housing assembly to the intake manifold.

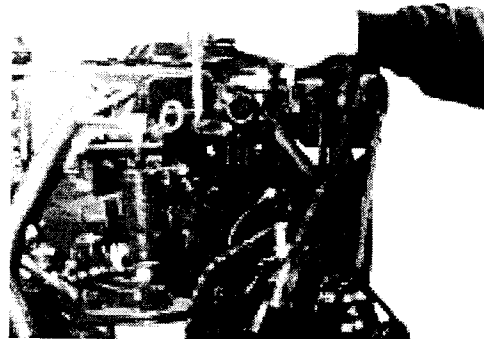


Press the thermostat and rubber ring assembly into the lower half of the thermostat housing.

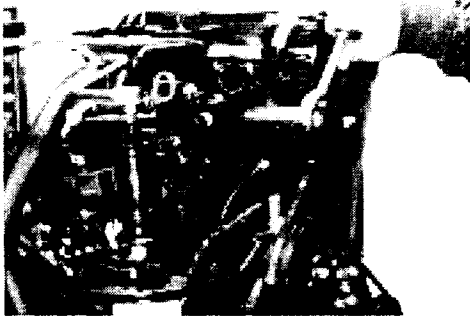
**⚠ IMPORTANT** *Be sure the gasket is aligned with the bolt holes before tightening the bolts. Misalignment will damage the gasket and cause leaking of the engine coolant.*



Install a new gasket 3852111-8 for the thermostat housing.



Install the two remaining bolts with the assembled expansion tank bracket. Tighten the thermostat housing bolts.

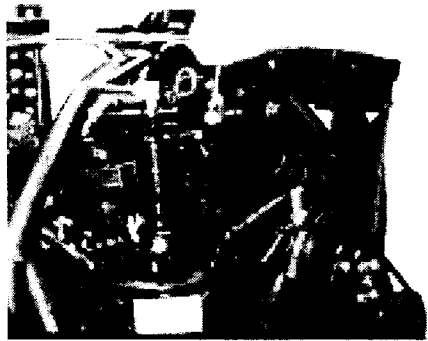


Install the front thermostat housing plug 968146-1.

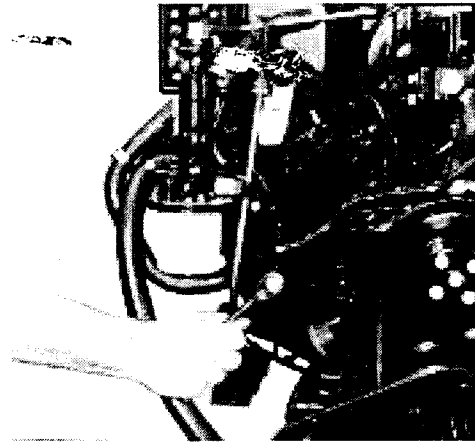
**▲ IMPORTANT** *The thermostat housing may come with the plugs installed finger tight only. If this is the case, remove the plugs, coat them with thread sealer and install according to these instructions.*



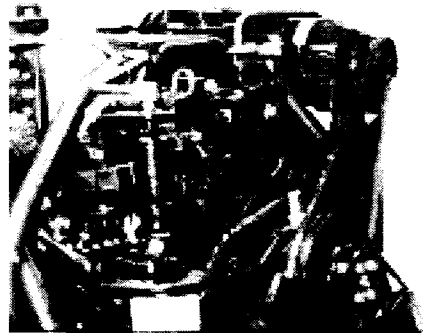
Install the bypass hose "G" between the hose fitting on the thermostat housing (3) and the circulation pump.



Install the side the side thermostat housing plug 968145-3.

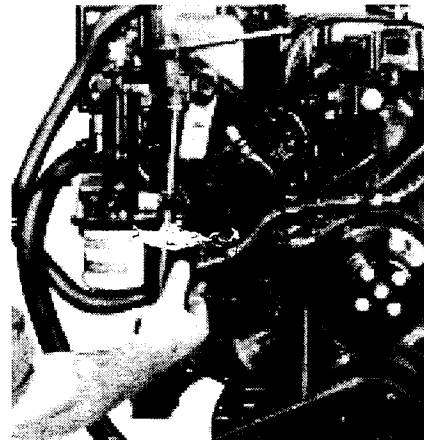


Remove the nuts holding the fuel filter bracket onto the starboard cylinder head studs.

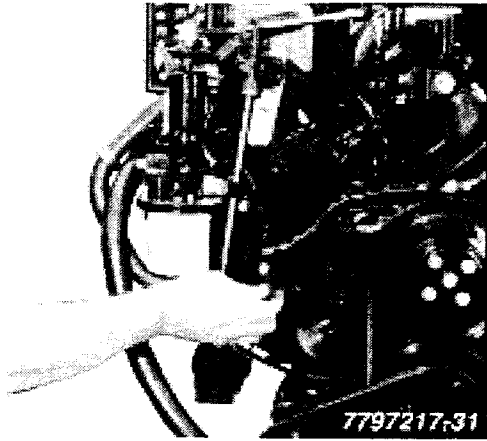


Install the top thermostat housing plug.

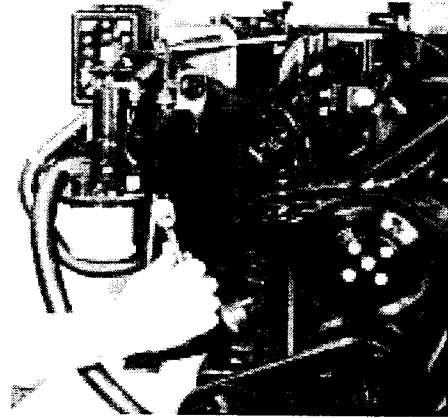
**▲ IMPORTANT** *Reconnect the ECM temp switch.*



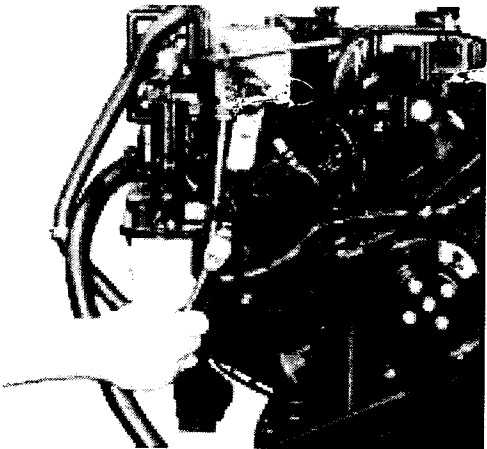
Install the "J" clamp 3855719-5 for the wiring harness on the top stud with the wire harness supported by the clamp and install a threaded spacer 3851962-5.



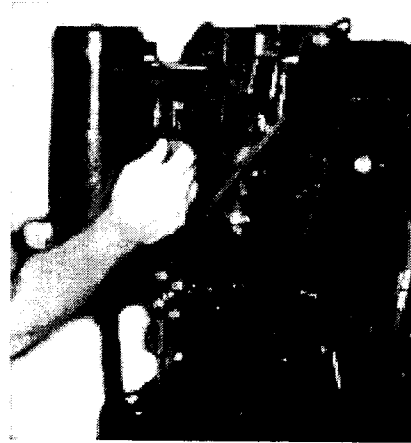
Install another threaded spacer 3851962-5 onto the lower stud.



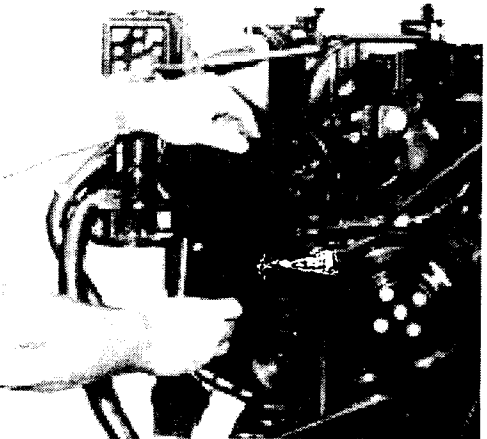
Using a 5/8 in. socket, tighten the heat exchanger bracket bolts.



Using a 5/8 in. socket, tighten both the threaded spacers.

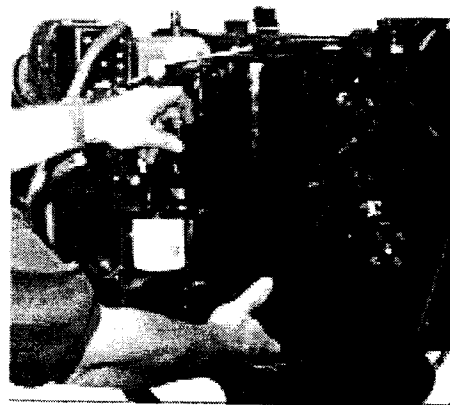


Press the brace 3851595-3 around the waist of the heat exchanger. Install the brace and heat exchanger assembly with two 845444-8 screws with the heat exchanger outlets facing the appropriate direction.

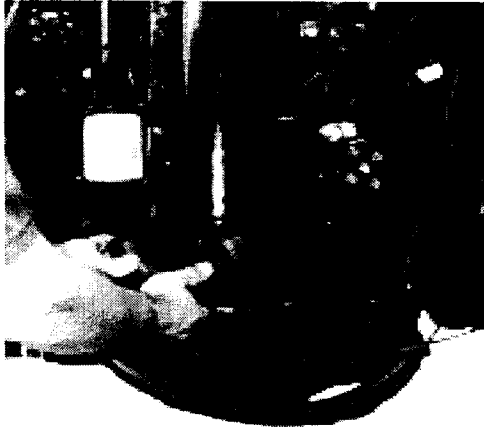


Install the heat exchanger bracket 3851394-1 using 2 bolts 955688-7 onto the threaded spacers.

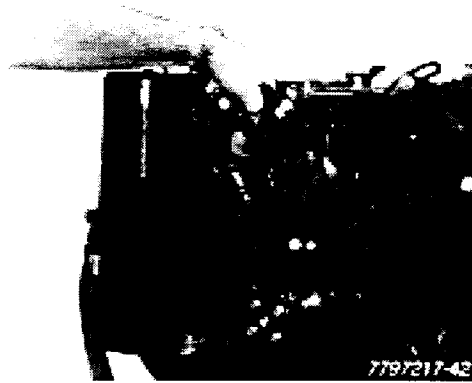
**⚠ IMPORTANT** *Be sure not to pinch the wiring harness.*



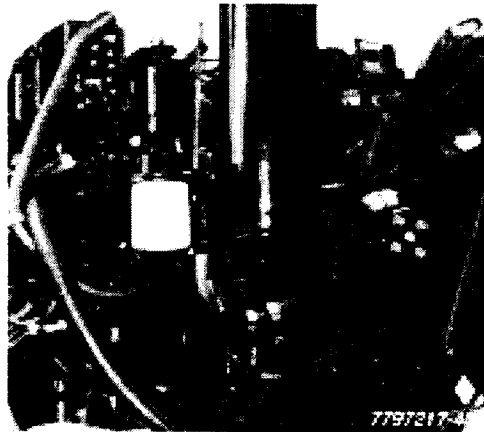
Use the two bolts 945444-8 and compression bar 3851396-6 to tighten the brace around the heat exchanger. Make sure the heat exchanger is secure and clears all components of the engine.



Install hose 3851591-2 onto the circulation pump.



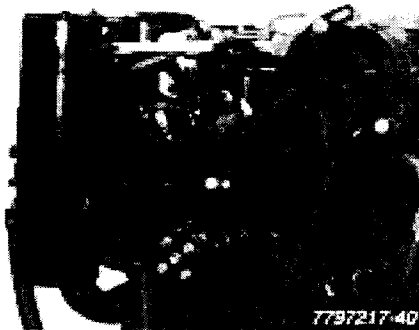
Install two hose clamps 961670-7 on the hose. Fold the hose in half and place between the heat exchanger and the thermostat housing. Press the fold down while twisting.



Position heat exchanger in its mounting location. If necessary, rotate heat exchanger so coolant outlet "G" clears the fuel filter and aligns with hose.



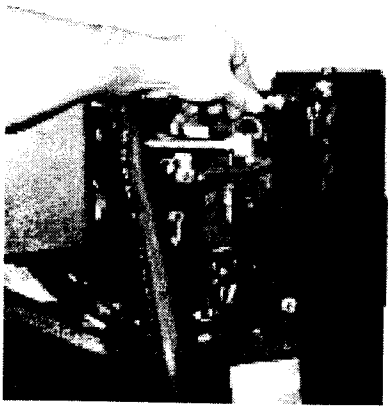
Remove the shipping plug from the air bleed vent hole "H" on the heat exchanger.



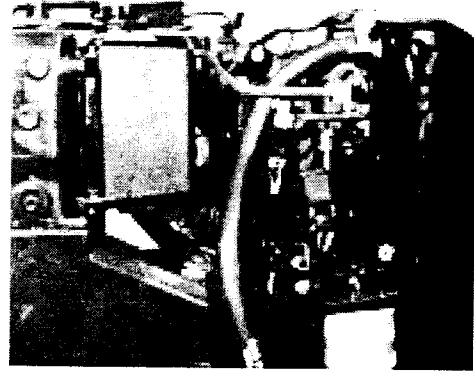
Measure the distance between the heat exchanger coolant inlet and the thermostat housing outlet. Cut the measured amount from hose 3851593-8.



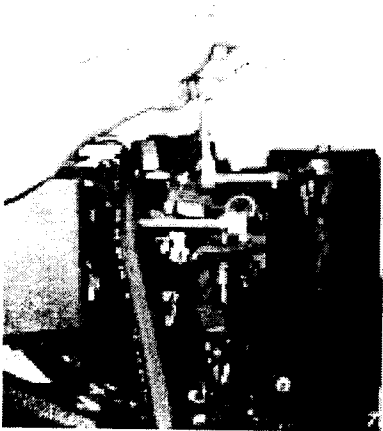
Coat the threads of the hose barb elbow 3853598-5 with thread sealant and install in port "H" of the heat exchanger.



Coat the threads of the hose barb elbow 3853598-5 with thread sealant. Install in port "B" of the heat exchanger.

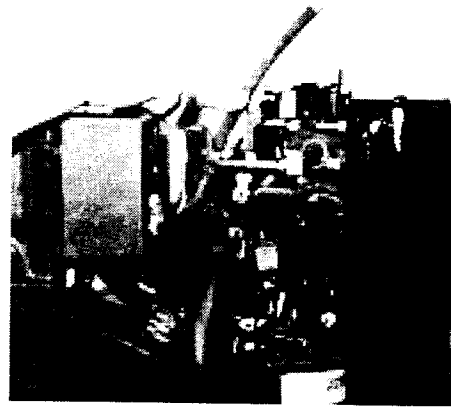


Remove the preformed hose that is attached to the check valve.

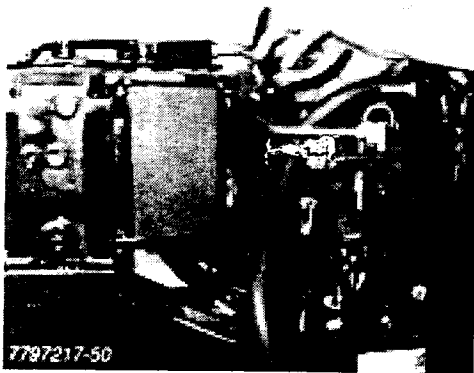


Tighten the fitting using a 9/16 deep socket.

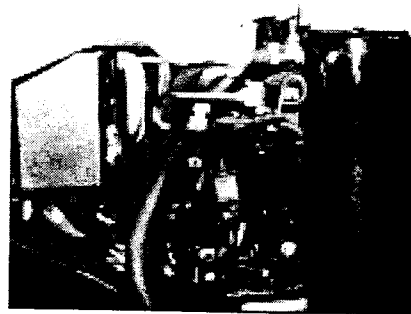
**⚠ CAUTION** *Do not overtighten.*



Cut a length of hose 943367-3 and install onto the vapor separator tank check valve with hose clamp 961666-5.

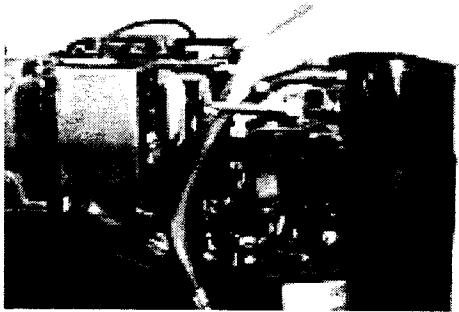


Remove the hose clamps attaching the vapor separator tank water hose.



Install the other end with hose clamp 961666 to the heat exchanger port "B".

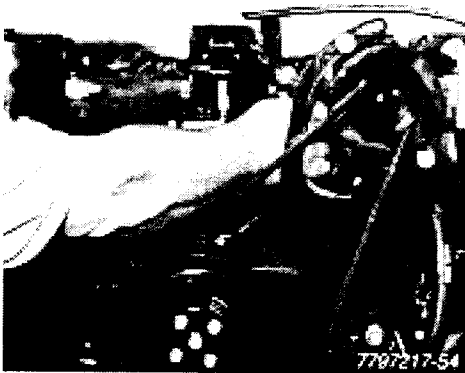




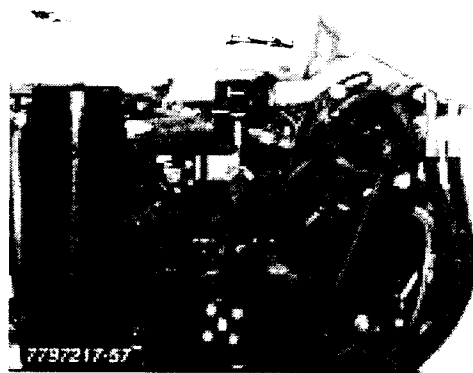
Install the starboard exhaust manifold water hose to the heat exchanger fitting "C".



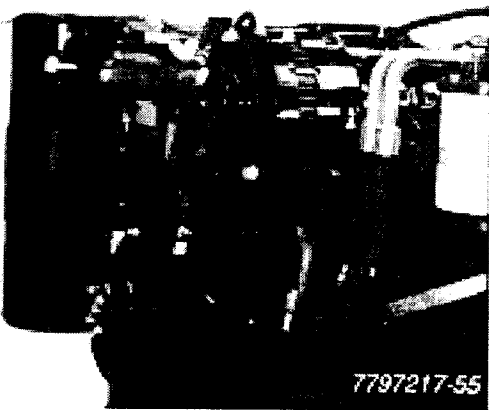
Attach the raw water pump hose to the heat exchanger raw water inlet fitting "A".



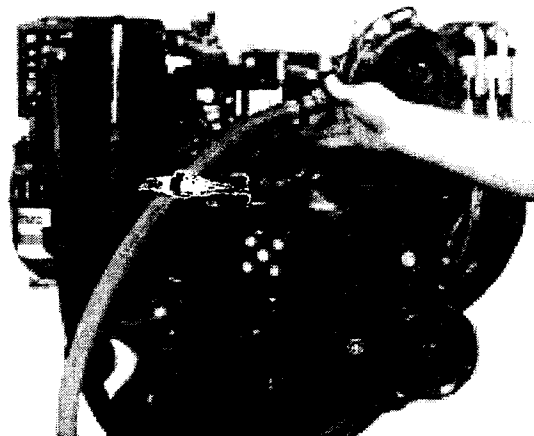
Cut a 330mm length of hose 943369-9. Install hose coupler 3851413-9 to the port exhaust manifold water hose with a hose clamp 3852602-6. Attach hose 943369-9 to the hose coupler installed on the port exhaust manifold water hose with a hose clamp.



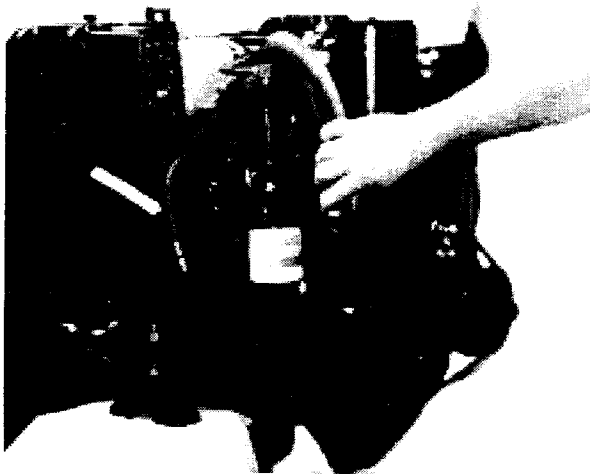
Install the expansion tank onto the mounting bracket.



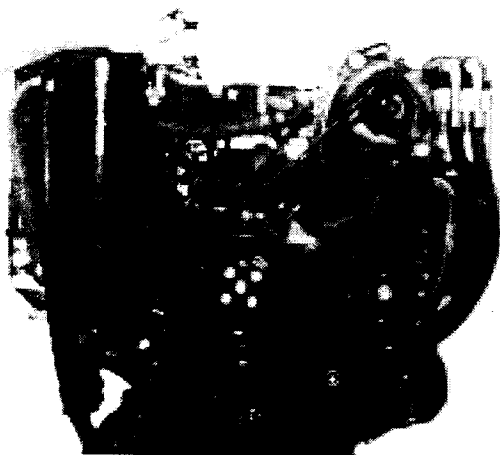
Attach the other end of hose 943369-9 to the heat exchanger fitting "C".



Cut a 736mm length of hose 943369-9. Assemble the 90 degree hose bend 857500-3 to the hose with hose coupling 3851413-9 and hose clamps 961666-5. Attach the hose assembly to the expansion tank using hose clamp 961666-5.



Attach the other end to the heat exchanger inlet fitting "G".



Install the expansion tank vent hose between the expansion tank vent and the hose barb elbow fitting on the heat exchanger "H".

**▲ IMPORTANT** Check all hose clamps to make sure they are tight. Inspect all hoses making sure they are not twisted or collapsed. Secure all loose hoses with the tie wraps provided. Be sure no hoses or wires are close to the belts so that they may get caught.

## ▲ *Filling the Cooling System*

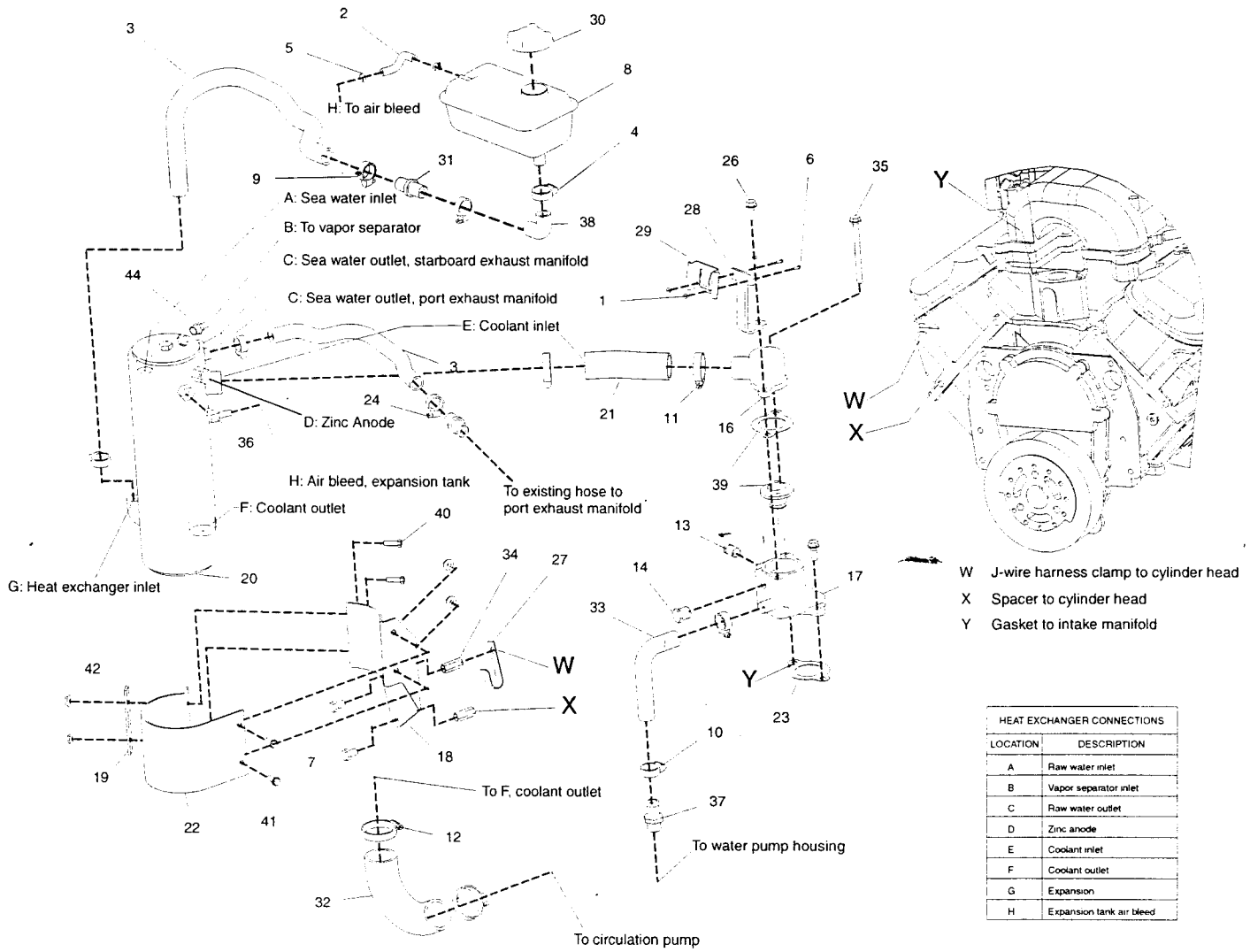
1. Prepare a 50% fresh water, 50% antifreeze mixture. It is important not to exceed 50% anti-freeze in the mixture. An excessive amount of Anti-Freezer may cause overheating. Antifreeze not only protects the engine coolant from freezing, but also protects against corrosion in the fresh water side of the cooling system and increases the boiling point of the coolant.

**▲ CAUTION** *To prevent damage during freezing temperatures the entire raw water side of the fresh water system **must** be drained completely.*

2. Install the engine drain plugs removed from step 1. Remove the expansion tank cap (22) and fill the cooling system with the prepared mixture. Fill the system slowly allowing any trapped air to bleed. Fill the cooling system until the coolant is between the "Max" and "Min" marks on the expansion tank (17). The closed cooling system capacity is approximately 5 Gallons (20 liters).

3. Start the engine to purge the cooling system of air.

# Assembly



Ref.	P/N	Description	Qty.
1	940119-1	6-40 Nut UNF	2
2	942700-6	Hose	1.5M
3	943369-9	Hose, heat exchanger to expansion tank	1.7M
4	945652-6	Hose clamp	6
5	945657-5	Clamp	3
6	950004-2	UNF screw, 6-40x1/2	2
7	955688-7	7/16-20 cap screw	2
8	861105-5	Expansion tank	1
9	961666-5	Hose clamp	3
10	961667-3	Hose clamp	1
11	961670-7	Hose clamp	2
12	961672-3	Hose clamp	2
13	968145-3	Plug, 3/8-18 NPSF	1
14	968146-1	Plug, 1/2-14 NPSF	1
16	3851383-4	Thermostat housing, upper	1
17	3851384-2	Thermostat housing, lower	1
18	3851394-1	Bracket	1
19	3851396-6	Compression bar	1
20	3851587-0	Heat exchanger	1
21	3851593-8	Hose	1
22	3851595-3	Brace	1

Ref.	P/N	Description	Qty.
23	3852111-8	Gasket	2
24	3852602-6	Clamp	2
25	943369-9	Hose	330mm
26	3853401-2	Boi*	2
27	3855719-5	J-Clamp	1
28	3858329-0	Bracket, expansion tank	1
29	3857422-4	Bracket, expansion	1
30	1674083-9	Cap, expansion tank	1
31	3851413-9	Connecting pipe	2
32	3851591-2	Hose	1
33	3851592-0	Hose	1
34	3851962-5	Spacer	2
35	3853391-5	Screw	1
36	3853598-5	Hose barb elbow	1
37	479974-8	Nipple	1
38	857500-3	Hose	1
39	875788-2	Thermostat kit	1
40	945444-8	Flange screw, 8x25	2
41	946173-2	Flange screw, 8x20	4
42	948645-7	Lock nut	6
43	860994-3	Decal	1
44	3851596-1	Fitting	1

